

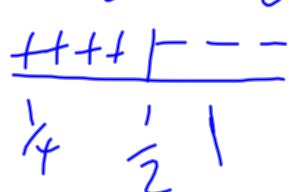
$$f(x) = xe^{-2x}$$

+1 $f'(x) = e^{-2x} - 2xe^{-2x}$

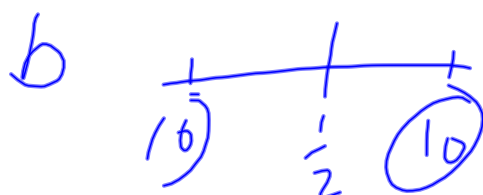
$$e^{-2x}(1-2x)$$

$e^{-2x} \neq 0$ $x = \frac{1}{2}$ +1

$1-2x=0$ $\frac{2x}{2} = \frac{1}{2}$



$[0, \frac{1}{2}] = \text{increasing}$ +1
 $[\frac{1}{2}, 10] = \text{decreasing}$ +1



absolute max = $\frac{10}{e^{20}}$

$$xe^{-2x}$$

$$10e^{-20} = \frac{10}{e^{20}}$$

+1 checking endpoints and critical #

+1 abs max
 $(\frac{1}{2}, \frac{1}{2e})$

absolute min = 0

$De^0 = 0$

+1 justifying

+1 abs min
 $(0, 0)$

$x=0$

$x=\frac{1}{2}$

+1 justification

$x=10$

$(\frac{1}{2}, \frac{1}{2e})$ is the absolute maximum because absolute extrema occur at relative extrema or endpoints and I've checked all 3.

OR $(\frac{1}{2}, \frac{1}{2e})$ is the absolute maximum because there is only one ~~relative~~ critical point for xe^{-2x} and it is a maximum,

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$$a) \quad s''(t) = a(t) \quad s'(t) = v(t) \quad 10 \int e^{2t} = \frac{e^{2t}}{2} + C$$

$$a(t) = 10e^{2t} \therefore s''(t) = 10e^{2t}$$

$$v(0) = 5 \quad s'(0) = 5$$

$$v(t) = \frac{10e^{2t}}{2} + C$$

$$v(t) = \frac{10e^{2t}}{2} + 0$$

$$5 + C = 5 \\ C = 0$$

$$v(0) = \frac{10e^{2(0)}}{2} + C \\ = \frac{10(1)}{2} + C = 5 + C$$